A DIFFERENCE IN FRAME

THE FRAMING OF STEM CELL RESEARCH IN NEWSPAPERS ACROSS CANADA

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A sub-thesis submitted in partial fulfillment of the requirements for the award of
Master of Science Communication

DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma at any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except when due reference is made in the text. The empirical work described within was not carried out with any other person.

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C'est fini. Merci Dieu.

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CHAPTER 1: INTRODUCTION

Stem cell research has been one of the most highly debated medical and scientific areas of the last few decades. As the controversy continues, those in the media continue to recount the various breakthroughs, setbacks, and ethical dilemmas associated with the research. As a result, it has become more important than ever to discover how stem cell research has been portrayed in the media, and in some way, to understand how this portrayal may have affected the public.

This paper details research into the portrayal of stem cells in Canadian newspapers since the turn of the millennium. The concept of media framing was employed to evaluate this portrayal, and a sample of articles was sorted into four media frames: *possibilities, revolutionary, cautionary,* and *ethical debate.* The results offered insight into the common themes and trends in newspapers published across the country.

This sub-thesis consists of three main components: a literature review, methods section, and a journal article. The literature review – Chapter 2 – provides a background on stem cells, media framing, and the methodology behind this research; the methods section – Chapter 3 – details the methods for this research; and the journal article – Chapter 4 – is designed to be submitted to the journal *Science Communication.*

Research Problem and Questions

While many in the field have claimed that stem cell research is one of the most promising medical areas to have developed in the last few decades, it is also widely known as one of the most controversial areas of medical research. The ethics of this research have been debated in political, religious, and scientific arenas, and as the controversy continues, those in the media continue to recount the various breakthroughs, setbacks, and ethical dilemmas associated with the research. As a result, it has become more important than ever to discover how stem cell research

has been portrayed in the media, and in some way, to work towards understanding how this portrayal may have affected the public.

The media's portrayal of stem cell research is reflected in the 'framing' of articles that discuss it. A frame is a central organizing idea that is reflected and communicated by an article, and has been shown to have a significant impact on the views and opinions of the reader. A frame often has the effect of biasing the reader, without their knowledge.

Because the majority of the population receives all their information on stem cell research from the media, the media's framing of this controversial and pivotal research is likely to have a significant effect on the views of a population, and indeed, a nation.

As such, this research seeks to answer the following questions:

1) What frames are commonly employed by Canadian newspapers when discussing stem cell research?

2) How has the use of these frames changed over the last 10 years? and,

3) How commonly are each of these frames used by newspapers across Canada?

It should be noted that there are many levels at which framing of the material within an article can take place. The scientists who explain their work to a journalist can frame their explanation, the journalist can frame the issue as they write their article, and an editor can also impact framing. In addition, each reader of an article can put their own frame on an issue, as they integrate new knowledge with their own history, knowledge, and experience. This research focuses not on the level at which this framing takes place, but on the result – the frames which are evident in the text of newspapers.

Study Overview

This research seeks to answer these questions by first discerning the types of frames used by the media in the past ten years. This was accomplished by sorting a large selection of stem cell related newspaper articles according to their frames. The newspapers analyzed were chosen to cover a broad range of geographic areas within Canada, and based on their availability in an electronic searchable database that dated back to at least 2000.

The four frames identified were:

- the possibilities frame,
- the revolutionary frame,
- the cautionary frame, and
- the ethical debate frame.

Nearly 300 articles were evaluated, and the results were analysed to determine national trends. While the possibilities frame was the most prevalent and most commonly used frame across the country, there were significantly fewer articles framed that way in Western Canada than in Eastern Canada. However, the ethical debate frame showed the opposite trend, with more articles framed that way in Western Canada than in the East. There were also changes in the prevalence of the possibilities and ethical debate frames over time, from 2000 to 2009.

The Journal Article

In 2008, Raul Reis published an article discussing the framing of stem cells in Brazil and in the United States. Because this research offers similar insights, and follows on nicely from his work, the journal article in Chapter 3 was written with the intent for it to be submitted to the same journal that Reis' article was published in: *Science Communication.*

Because the article in Chapter 4 was created such that it could be a stand-alone paper, there is significant overlap between the journal article and the rest of this sub-

thesis. It also has its own references section. The literature review and methods section are designed to be supplementary sources of information. For further information on this process see the Notes for Examiners at http://is.gd/12f3T.

CHAPTER 2: LITERATURE REVIEW

This chapter outlines the literature, research and background information upon which this study is based. I will first discuss the science and ethics of stem cells, including a brief description of current legal and ethical standpoints in the United States and Canada. I will then present the basics of framing, its importance, and its place in the media, before moving on to the methodology of framing research. This will be followed with a discussion of previous frame-analysis research, including research done on the framing of stem cells in United States newspapers.

Stem Cells

Stem cell research has become one of the most promising, yet one of the most controversial scientific areas to develop in the last few decades. Stem cells' medical promise comes from their two unique abilities:

- The ability to self-duplicate: to continually divide themselves into two daughter cells identical to the original cell.
- The ability to differentiate into any other cell type: they can in essence become, and function as, any other type of cell in the body.

These skills have provided researchers with the ability to study and treat a large variety of degenerative diseases, and many in the field believe that stem cells will provide cures for Parkinson's, Alzheimer's, and many other diseases in the near future. However, a great deal of controversy has arisen over the generation of stem cells, since one of the primary sources of these valuable cells is the human embryo.

In this section, I will discuss some scientific basics about stem cells, including their origins and uses. I will then briefly describe the ethical issues concerning stem cells, including the two most strongly argued ethical debates surrounding stem cell

research. This will provide a necessary background for the framing research, as discussed in upcoming chapters.

THE SCIENCE OF STEM CELLS

The United States National Institute of Health defines stem cells as "master cells, with the ability to grow (differentiate) into any of the body's more than 200 cell types". These cells have the potential to serve as a repair system for the human body, replenishing other cells, while themselves dividing and reproducing theoretically without limit to sustain the body's stem cell population (Medicine Net, 2001).

These two characteristics of stem cells - their ability to differentiate into other cells types, and their ability to reproduce themselves indefinitely - make them extremely versatile and valuable to the scientific and medical communities.

Human stem cells fit into two categories: embryonic stem cells and adult stem cells. Embryonic stem cells, as the name implies, are derived from embryos. They are most commonly derived from the embryos that are produced and left over after in vitro fertilization procedures, and then donated to research. They are not frequently harvested from eggs fertilized within a woman's body, as this is outlawed in most countries. Adult stem cells (sometimes called somatic stem cells) are found throughout an adult's mature tissues in very small quantities. These cells are left over after embryonic development, and then proceed to multiply, replacing and replenishing damaged tissues in the body (National Institutes of Health, 2008) Contrary to popular belief, they are not only found in adults, but in people of all ages.

Adult stem cells are already being used in many treatments, which generally involve the removal and controlled replacement of stem cells from the patient's own body. Research is still ongoing with embryonic stem cells, and while no treatments are yet in use, many feel that there is a great deal of potential that is as yet untapped.

In fact, the medical community believes that stem cells hold the promise of being able to treat and cure degenerative diseases, such as Alzheimer's and Parkinson's diseases (National Institutes of Health, 2008). This promise stems from the belief that if researchers can target certain stem cells to differentiate into specific cell types, then they can create cells to replace faulty ones in the body. For example, the American National Institute of Health has stated that it may in the future become possible to generate healthy heart muscle cells in the laboratory and transplant those cells into patients with chronic heart disease (National Institutes of Health, 2008).

In addition to tissue replacement therapy, according to the National Institute of Health, studying embryonic stem cells may lead to new knowledge about processes in human development, and about cell differentiation. Many serious medical conditions, including cancer, are the result of abnormal cell division and differentiation. A better understanding of the genetic and molecular controls of these processes may generate more information about how many diseases arise and therefore suggest new strategies for therapy.

THE ETHICS OF STEM CELLS

The debate over the use of stem cells surrounds two particular aspects of the research. The first is the acquisition and use of embryonic stem cells. As mentioned previously, embryonic stem cells are commonly derived from embryos that remain unused after an in vitro fertilization procedure. Because getting these stem cells involves destroying an embryo, some have considered the procedure equivalent to performing an abortion.

The Catholic Church is one of the most outspoken groups that protest the use of embryonic stem cells. U.S. Bishop Donald Wuerl once wrote that "While [a stem cell] is a tiny speck, it nonetheless contains the elements out of which comes the fully developed human person" (AmericanCatholic.org, 2005). The stance of the Catholic Church is that the use of embryos in research is "a gravely immoral act" (U.S. Conference of Catholic Bishops, 2008).

This view is countered by the International Society for Stem Cell Research, who say that "...embryonic stem cell research and therapy would use donated embryos that, by virtue of donor instructions, will never enter a uterus" (International Society for Stem Cell Research, 2005). According to this view, since the embryos in question will never be allowed to grow into a human being, there is no harm in using the embryo for research, since otherwise it would eventually be destroyed anyway.

While use of embryonic stem cells has been debated at the highest levels of religion, it has also been a 'hot-button' issue in some of the highest levels of government - particularly in the United States. Former U.S. President George W. Bush in particular has been part of a large amount of controversy regarding the use of stem cells. In August, 2001, he announced that all new stem cell research would be banned from receiving federal funding. In essence, aside from privately funded research, he prevented any new stem cell research from starting, as of the date of his announcement (National Institutes of Health, 2008). Nearly eight years later, in March 2009, this ban was lifted by the new U.S. administration under President Barack Obama.

In Canada, there were no laws or guidelines governing stem cell research until March 2002, at which time the Canadian Institute of Health Research put "Guidelines for Human Pluripotent Stem Cell Research" into place. These guidelines outline restrictions on the origin of stem cells under research, and how ethically they are acquired, but otherwise do not prevent the study of stem cells in any way (Canadian Institutes of Health Research, 2007).

The second major ethical debate about stem cell research surrounds the issue of misuse. While stem cells hold potential for tissue replacement therapy and disease prevention, this potential could also result in other controversial treatments and procedures, specifically organ and human cloning. As researchers get closer to generating tissue replacement and stem cell based therapies, they also get closer to being able to clone human beings. The continuing investigations of the unique properties of the stem cells in tissue replacement therapy have been argued by some to be a slippery slope that will lead us straight to cloning (Thompson, 2001).

Framing

INTRODUCTION TO MEDIA FRAMING

In *The Empirical Approach to the Study of Media Framing,* James Tankard identified a media frame as a "central idea" that lies behind a story, providing an orientation to a subject's relevance, importance, value, and context (2003). These frames often have the effect of biasing the reader without their knowledge, and can therefore have a significant impact on the reader's - and in a broader context, the public's - opinions.

Todd Gitlin, in 1980, described a media frame using the metaphor of a picture frame. The way a frame affects a media article is analogous to the way that a picture frame affects the image it surrounds. For example, a metal picture frame and an elaborate wooden frame would emphasize different elements and moods in a picture. The various picture frames encourage the viewer to look at the image from different perspectives. In the same way, the framing of a media article emphasizes certain perspectives on the material in the article, and encourages the reader to take a particular view.

A few years later, Gamson added to this analogy by writing that "a frame is a central organizing idea for making sense of relevant events, and suggesting what is at issue". This explanation lends itself better to the metaphor of a house frame. In architecture, the frame of a building serves as an organizing structure upon which the rest of the house is built. In the same way, a frame can be considered the central organizing idea upon which a story is built.

These two analogies of media framing are still in use to help define media framing today, and they have the same purpose: to show that the frame of the article has a direct impact on how the content of the article is viewed by readers.

In this section I discuss the importance of framing and how it gets used in the media. After that, I discuss the qualitative and quantitative ways of examining framing, including three of the most common approaches to the empirical study of framing.

IMPORTANCE OF MEDIA FRAMING

The development of the concept of framing was an important step in understanding how the media's portrayal of an issue could influence the public. This is because it offered an improvement to the objectivity and bias paradigm, in which all media material was considered pro or con, for or against, positive or negative (Tankard, 2003). Framing offers additional perspectives, and can reflect the subtle differences that are possible when a topic is presented in different ways (Tankard, 2003). However, this subtlety has made framing much harder to define and explain than a simple pro-con analysis.

Another important aspect of framing is its acknowledgement that texts are able to define their own terms. According to Tankard, "framing recognizes the ability of a text... to define a situation, define the issues, and to set the terms of the debate... and convincing others to accept one's framing means to a large extent winning the debate" (2003).

For example, defining abortion as an act that raises questions about the life of the unborn child resonates strongly with the point of view of the pro-life movement. In contrast, defining abortion as an act that allows for the freedom of choice of the mother brings another point of view (that of the pro-choice movement) to the forefront of the discussion. These definitions are laid out most often without the reader's knowledge. Tankard likened framing to a magician's slight of hand, where attention is directed at one point, while manipulation happens at another.

MEDIA FRAMING

The framing of any material can be of interest because of the effect the content may have on the reader. Framing in the media can have a profound affect on public opinion because of the volume of people who read the material. In fact, media framing can have a great deal of influence on society. For example, in 2005, John Richardson noted that different frames could influence the reader's mind-set towards different racial groups. He applied different frames to mock editorial articles that centered on Supreme Court decisions regarding racial inequity, and

created a study to test the effects of the framing on the readers. His studies showed that several of the frames had a significant effect on the attitudes of the participants regarding white supremacy, white guilt, and modern racism. However, it has also been noted by Schön and Rein in 1994, that once a particular frame on an issue becomes predominant in the media, it becomes very difficult to shift the image of the issue to another perspective.

Since media framing can have such an impact on public views, it is understandable that groups have started using framing to their advantage. In fact, companies such as the U.S.'s Media Research and Action Project (MRAP) have formed to help social groups, not-for-profit organizations, and charities create new frames for themselves that will influence a broader range of the public. In the same way, people working in public relations and communications have a great deal to gain from understanding framing, and being able to use the knowledge to push their, and their company's agenda.

As noted by Priest and TenEyck in 2003, the media is the primary source of science and technology information for a significant portion of the population. As a result, it is important to analyze and review the framing of science issues that occur in the media, because the frames are likely to have an effect on the majority of the public.

Methodology

Since the discussion of framing has largely replaced the paradigm of objectivity/bias and pro/con media analysis, there have been many methods put forward to analyze framing, specifically media framing.

The fact that frames are not easy definable has led to some problems in evaluating them. Namely, early frame analysis research primarily utilized a qualitative text-analysis framework. The text-analysis procedure uses a single researcher, working alone, as the expert in frame identification within media content. This approach not surprisingly results in subjective, non-repeatable data collection.

In addition to this problem, qualitative techniques often employ an inexact approach to defining frames. This results in a list of possible frames that may not be exhaustive, or not mutually exclusive, and can therefore cause significant problems for people who are sorting articles into their respective frames. This in turn affects the repeatability of the research. (Tankard, 2001).

There are three common approaches to frame analysis that are more quantitative in nature, and generate more repeatable, reliable results: The Media Package Approach, as developed by Gamson and Modigliani in 1989; the Multidimensional Concept Approach as outlined by Swenson in 1990; and the List of Frames Approach, as developed by Tankard et al in 1990. In 2003, Tankard summarized these three approaches, calling them "The empirical approach to media framing".

THE MEDIA PACKAGE APPROACH

The Media Package Approach revolves around searching for key words, phrases, and common language that help to identify a particular frame. These keywords are assembled into a paragraph of paraphrased and quoted material that is characteristic of that particular frame. For example, Gamson and Modigliani developed a media package that framed nuclear power in terms of progress. They used phrases and words from pamphlets and other writings by nuclear power advocates, and created a paragraph summarizing the most typical comments and phrases used in that frame. To create this package, they looked specifically for sentences that included the use of five framing devices; and three reasoning devices. The framing devices were:

- Metaphors
- Exemplars
- Catch phrases
- Depictions
- Visual images

and the reasoning devices were:

- roots or causal analysis
- consequences and effects

- appeal to principles (moral/ethical claims)

To give an example, Gamson and Modigliani discussed the use of the progress frame surrounding discussion of nuclear power. According to their research, this frame presented nuclear power as a safe reliable technology that was necessary to remain advanced and modern. This was done by portraying the opponents of the technology as luddites who would have protested electricity and all other technological progress, and stating that a failure to develop nuclear power would hinder progress, economics, and social capital. This portrayal uses the framing devices of metaphors and exemplars, and uses the appeal to principles reasoning device and a description of consequences.

Once a media package is created for each frame within a certain issue, the packages can be used for evaluating the frame of other articles.

THE MULTIDIMENSIONAL CONCEPT APPROACH

The Multidimensional Concept Approach to framing is based on the idea that each article contains specific elements which reflect its framing. Swenson, who developed this approach, identified eight elements and dimensions that reflected the framing of an article in her particular area. For her research on the framing of abortion, the elements were:

1. Gender of the writer
2. Placement of the article (front page, editorial page, etc.)
3. Terms used to refer to the pro-choice group (eg. abortion rights)
4. Terms used to refer to the pro-life group (pro-life, right to life, anti abortion, etc.)
5. Whether the woman's rights or the fetus' rights are considered paramount
6. The morality orientation of the article
7. Discussion of when life begins
8. Terms used to refer to the fetus

Swenson argued that the frame of an article can be determined by identifying each of these elements. This is based on the premise that these elements (while not causative of the frame) are in fact co-relational with the frame, and are therefore sufficient to determine the frame of the article. This list of elements would need to be re-developed for each new area of research.

THE LIST OF FRAMES APPROACH

The list of frames approach, developed by Tankard et al., is based on each possible frame being characterized by a series of keywords, catchphrases and images, as well as eleven framing mechanisms. Similar to the Multidimensional Approach, this technique is based on the premise that the mechanisms (below) reflect the frame of the article. However, in contrast to the Multidimensional Approach in which the elements are directed at a particular issue, these mechanisms are general enough to be applied to different topics.

The keywords, catchphrases, images and framing mechanisms are:

1. Headlines and kickers
2. Subheads
3. Paragraphs
4. Photo captions
5. Lead
6. Selection of sources or affiliations
7. Selection of quotes
8. Pull quotes (quotes that are blown up in size for emphasis)
9. Logos (graphic identification of the particular series an article belongs to)
10. Statistics, charts, and graphs
11. Concluding statements or paragraphs of articles

These three approaches to framing each provide a basis against which each article can be measured to reveal its frame. This means that there is a standard that can be used by different people (coders) to evaluate the frame of any particular article. Because the coder can rely on this background (ie. the media package in Gamson and Modigliani's approach, the elements in Swenson's approach, and the mechanisms in Tankard's approach) to assist them in determining the frame of the articles they evaluate, there is significantly less subjectivity introduced into the coding process, and in turn greater reliability of results than is evident in early single-researcher-expert techniques.

Building on this, the amount of subjectivity in these empirical approaches can be measured by the percentage of coder agreement. That is, different people read and sort articles into their respective frames, and a measurement is then taken of how often articles are sorted the same by each person, or 'coder'. The percentage of coders that agree on the framing of an article is a reflection on the strength of the framing approach, whether media package, multidimensional, or list of frames. Each of these techniques has been shown to be able to generate results with the 80% coder agreement that Tankard (2003) has argued reflects an acceptable robustness of the framing technique. (Swenson - 100%, 1990; Tankard - 89%, 2001; Gamson and Modigliani - 80%, 1989).

Coder agreement has been shown by Hendrickson (1994), to be highly dependent on the number of frames in any particular research project. Reducing the number of frames significantly improves the level of coder agreement. However, reducing the number of possible frames impairs the value of the work, by returning fewer points of interest. For example, reducing the number of frames to only two practically returns the research to the pro/con, objectivity/bias technique.

While the three techniques for quantitative framing discussed above are the three most common approaches, many researchers have been adapting them to suit their own needs. However, the elements of an empirical approach to media framing remains the same. These include: a series of indicators or background for each frame, which gives coders a basis upon which to sort articles, and a measurement of the efficacy of this sorting.

Previous Research

As discussed earlier, media framing is likely to have a strong effect on the opinions and views of public, and so there is a fundamental need to analyse and review the framing of science issues in the media.

Many researchers have taken on this challenge, though some areas are far more researched than others.

Nuclear power was one of the first scientific advances to undergo significant media frame analysis. Gamson and Modigliani's pivotal 1989 paper, which introduced the media package approach, explored the effect of several media outlets (including newspapers) on public opinion regarding nuclear power. Their research recounted the changing of public opinion over time, and showed a strong tendency for the media to frame nuclear power according to "runaway" (the technology is farther ahead than our ability to understand or deal with it) or "progress" (the technology is necessary for development) frames.

While nuclear power was one of the first scientific areas to undergo significant framing research, biotechnologies and nanotechnologies have been some of the most *common* science areas to undergo this type of research. More specifically, research has centered on agricultural biotechnology (such as genetically modified foods) and medical technologies (such as vaccines, cloning and stem cells).

In 2005, Anderson et al. reviewed the framing of nanotechnology in British newspapers during a pivotal time in the development of the technology. They discovered that newspapers predominately framed nanotechnologies with "strong optimism, when in relation to the benefits of nanotechnologies combined with concerns about the risks and uncertainties about possible benefits or risks". Anderson also noted a prominence of newspaper articles with "science fiction" frames.

Priest and Ten Eyck performed a study in 2003 on the media framing of genetics – specifically, medical and agricultural genetic issues. Their research showed genetics

research to be primarily framed as "progressive" across the 16 countries that were studied. The second most commonly used frame centered on public accountability (eg: if something goes wrong, who will be accountable?).

The media framing of agricultural biotechnology and genetically modified food has been researched thoroughly across the United States, in both elite newspapers and local newspaper coverage (Crawley, 2007). As previously mentioned, these areas of research have been shown to predominantly figure frames of economic prosperity and progress. (Marks, 2001; Ten Eyck, 2001 and 2003).

In 2008, Clarke discussed how newspapers framed the autism-vaccine controversy. This controversy was caused by the announcement of a link between childhood vaccines, and the development of autism. Some newspapers reported on this topic by discussing only the *links* between childhood vaccines and autism development, meanwhile, other newspapers discussed the lack of a link (*non-link*), or even the research which disputed the link (*anti-link*). This research revealed a general balance of each side of this debate in both British and American elite press.

The media framing, as well as the public perceptions of cloning, especially during the years in which Dolly the sheep was in the news, have been heavily researched. Holliman (2004), Peterson (2002) and Hopkins (1998) have found that the media's framing of cloning primarily surrounds the ethical implications of the research.

There has also been some analysis conducted specifically on the framing of stem cell research. Raul Reis (2008) noted the similarities and differences in newspapers' framing of stem cells between Brazil and the United States. He noted that this framing was predominately positive and scientific in Brazil, while US newspaper articles tended to frame stem cell research in terms of its political and ethical dimensions.

These studies, and others, highlight how media frames are used by the media, and how analysing these frames on a topic such as stem cell research allows for a better understanding of how the topic is portrayed, and perceived, by the public.

Conclusion

Stem cell research is a controversial area of medical research, and will continue to be an area of great debate and contention for years to come. The media coverage of this issue and other medical and scientific issues is continuing to be studied, and already the way in which newspapers in the U.S. and Brazil frame stem cell research has been discussed at length. Canadian newspapers however have not yet been reviewed in this area. As such, the following research will strive to discern what frames have been used in the last ten years by various Canadian newspapers when discussing stem cell research. It will also investigate how the use of these frames changes from one region to the next and from one year to the next.

Combined with future work, it is hoped that this research will offer valuable insight into the public perceptions of stem cell research in Canada.

CHAPTER 3: METHOD

Overview

Drawing on the literature discussed in the previous chapter, my research into the framing of media articles addressing stem cells in newspapers across Canada involved the following six steps; each of which I will discuss in more detail over the course of this chapter.

- Article collection
- Article selection
- Frame development
- Article coding
- Coding agreement / quality control
- Analysis

Article collection

Newspaper articles were gathered from the Vancouver Public Library's "Newsstand" archive, which is Canada's largest national public-access newspaper archive. This electronic archive houses over 100 Canadian newspapers, large and small, each having been archived for varying lengths of time.

Ten newspapers from a variety of locations across Canada were chosen for analysis. This selection was based on the years of availability of the newspaper's archive, and the location of the primary distribution of the newspaper. The newspapers were selected on the basis that they:

1. have a complete archive, without interruption, dating from at least 2000 until February 24th, 2009 – the date of collection – and,

2. as a whole, cover as large and diverse a geographic area as possible within English-speaking Canada.[1]

According to these selection criteria, the following newspaper archives were selected for analysis[2]:

- The Edmonton Journal
- The Vancouver Sun
- The Calgary Herald
- The Saskatoon Star-Pheonix
- The Ottawa Citizen
- The Hamilton Spectator
- The Windsor Star
- The Toronto Star
- The Fredericton Daily Gleaner
- The Moncton Times-Transcript

Article selection

From the newspapers listed above, articles were selected for analysis according to the following criteria. The article must have:

1. had "stem cell" in either the lead or headline,
2. been published between 2000 and the present,
3. had at least 100 words,
4. discussed stem cells directly for a minimum of one-third of the length of the article[3],

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[1] Excluding Quebec, where the French language would impede the analysis of the newspapers.

[2] Additional newspapers would have been selected from the Eastern Canada region had there been any others that met the first newspaper selection criteria: an archive dating back to 2000.

[3] This provision was added to avoid analysis of articles that mentioned stem cells because of their relation to another topic, but contained no substantial frame on stem cell research. Rather, these articles

5. not discussed stem cell research that *solely* addressed the cancer-causing elements of stem cells. [1]

Searching the newspaper database using selection criteria 1 and 2 generated a list of well over two thousand articles. Of these, every fourth was selected to provide a list of randomly selected articles. Selection criteria 3, 4 and 5 were ratified after this random selection to save time. This process resulted in a chronologically sorted list of 296 articles for frame analysis.

Frame development

I chose to use the media package approach, as discussed in Chapter 2, and as outlined by Gamson and Modigliani in 1989.

Stem cells are a highly controversial topic, yet I felt that there were not enough elements and dimensions (as used in the multidimensional approach) or mechanisms (as used in the list of frames approach) which would adequately capture the different themes and values embedded in each of the newspaper articles. On the other hand, the framing and reasoning devices of the media package approach seemed more likely to capture the context of these themes.

As such, frames were established using the media package approach. Keywords, phrases and common language were gathered from a selection of newspaper articles, and from literature written by key players in the issue, who have displayed consistent values and opinions. For example, the phrase "gravely immoral act", coined by the Catholic Church in reference to stem cell research, was incorporated into one frame.

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more commonly framed the main topic, and stem cells were secondary to that topic. Topic examples commonly excluded on this basis include: cloning, politics and celebrities.

[1] Some articles only discussed stem cells as cells already in the human body, which have the potential to cause cancer. This research does not fit into the more common stem cell research framework, and does not have the same ethical considerations. As a result, this selection criterion eliminated those articles that met all the other criteria, but did not contain information on stem cell research as it is most commonly known.

Using the list of keywords and phrases, four frames were created. These frames were designed to be exhaustive, and as mutually exclusive as possible. This increases coder agreement, and therefore the robustness, and repeatability of the framing process.

"Media packages" were developed for four frames:

- The Possibilities Frame
- The Revolutionary Frame
- The Cautionary Frame
- The Ethical Debate Frame

THE POSSIBILITIES FRAME

Scientists are making concrete steps towards using stem cells in medicine. Research in this area might one day lead to treatments and cures for many degenerative diseases, but researchers say it's early yet. Because the cells have ability to differentiate into any other type of cell in the body, their potential for medical treatments is vast. The research for many of these therapies is currently underway, and only time will tell if they are as useful as researchers hope. This current research is certainly promising.

THE REVOLUTIONARY FRAME

A breakthrough has been made in cancer research. John Smith, a chemotherapy patient, is already recovering more quickly than anticipated. Even to physicians leading the study, his results have been remarkable. The chameleon-like powers of the stem cell have made anything possible, and these cells have become invaluable to researchers. The revolutionary technique has shown that stem cells have the ground-breaking potential to treat and possibly cure many diseases, including Parkinson's and Alzheimer's, and could in fact provide insight into cures for cancer and paralysis.

THE CAUTIONARY FRAME

While there could be some health benefits derived from stem cells, most of the research is under debate, and patients are often given to false hopes regarding the success of the treatments. There are potential pitfalls and significant dangers associated with the treatments. Long-term effects could include increased susceptibility to cancer and genetic mutations, meanwhile, actual benefits are often over-exaggerated. The treatments and medical claims need to be treated with caution, though there are potential benefits of the research.

THE ETHICAL DEBATE FRAME

Funding and supporting stem cell research has been a controversial issue to say the least. It has been deemed by some to be the most pivotal research of our day, while others call it a slippery slope. The ethical dilemmas surrounding the issue are extensive, and must be considered ahead of potential health benefits. Many people have expressed concerns regarding the destruction of embryonic life and consider it akin to abortion. Some say this research is a gravely immoral act, while others deem it to be vital to progress. Politicians, religious leaders, and scientists all face criticism for their moral stance, and the issues must be resolved.

Article coding

After each media package was created, coding began on the articles selected in previous steps. Coding involved the sorting of each article into its respective frame (Progress, Revolutionary, Cautionary, Ethical Debate), using the media package paragraphs as generalized examples of each frame.

After thirty articles were sorted, a test of the quality of the coding was performed. This step is described below. Once the quality of the coding system was verified, the coding step was completed, and the analysis started.

In some cases, articles contained elements of more than one frame. If an article contained approximately equal elements of more than one media package, coders were instructed to place greater importance on those elements found in key areas of the article, such as the headlines, leads, quotes, and concluding statements - those areas that are deemed important in the list of frames approach, as proposed by Tankard in 1990. In this way, each article was sorted into its most applicable frame.

To give an example of this procedure, below are some quotes from one particularly difficult article (*"Results, not Bush, slowed embryonic stem cell research", January 30th 2009, Calgary Herald*) that contained elements of the all four frames.

"Revolutionary" elements included:

- "Let the age of Enlightenment begin!"

"Possibilities" elements included:

- "The U.S. Food and Drug Administration just approved a clinical trial for an embryonic stem cell treatment for spinal cord injuries, thereby making the U.S. the first in the world to conduct a human embryonic stem cell trial... but the big hope is not yet for a cure, but to determine the treatment's safety."
- "Embryonic stem cells are highly sought after because they have the potential to develop into almost any cell found in the human body"

"Ethical debate" elements included:

- "They're... controversial because they are obtained from embryos that - here's the catch - are destroyed during the extraction. As a result of the hot debate on the issue, Bush finally compromised and said that his government would not fund the creation of new cell lines but it would fund research using the embryonic stem cell lines that were already in existence."

"Cautionary" elements included:

- "Many private companies have been reluctant to fund embryo research because it... so far, has shown few signs of success."
- "The transplants not only failed to help the patients, they exacerbated the disease and caused irreversible side effects"

Because this article contained elements of more than one frame, it was ultimately sorted according to the frame of the key areas of the article. The title of the article: "Results, not Bush, slowed embryonic research", fits into the cautionary frame, as does the concluding statement: "The only thing holding back stem cell research is that it might not work".

Because the List of Frames Approach indicates that the title and concluding statements are important in evaluating the frame, and in the above article both these important pieces reflect the cautionary frame, it was decided that this was the most applicable frame.

This article-coding step was conducted for each of the 296 articles.

Coding agreement / Quality control

The quality of the coding step was evaluated using coder agreement as an indicator. Ten people were asked to follow the coding step on 10 articles, without knowing which frame I had previously sorted the article into. The information sheet and the question sheet that was given to these quality control coders can be found in Appendix 1.

This repetition provided a basis for identifying how repeatable the technique is, and thus, how strongly the media frames were described in the frame development step. Following Tankard, I held that 80% agreement between coders was considered acceptable (2003).

Coder agreement for the ten articles was 82/100 articles, ranging between 10/10 and 6/10 agreement from each coder, and therefore within an acceptable range. Had it not been, lowering the number of possible frames, and re-developing the media packages could have increased it. The sorting process and quality control would then have to have been repeated.

Analysis

Once an effective sorting technique was accepted, and all 296 articles were sorted into their respective frames, a statistical analysis of this sorting was done using Chi squared analysis. This technique compares the observed number of articles in a category to the statistically expected value, and generates a "p" value that reflects the probability that the results are generated by chance. If this p value is, for example, 0.05, then there is a 5% chance that the observed value could have been generated by chance alone, without some cause affecting the observed values. This value is often referred to as the significance. A result can be considered significant if the p value is less than 0.05.

In the next chapter I present the results of this research and analysis in the form of a journal article to be submitted to the journal *Science Communication.*

CHAPTER 4: JOURNAL ARTICLE

The Framing of Stem Cell Research in Newspapers Across Canada

Abstract

Stem cell research has been one of the most highly debated medical and scientific areas of the last few decades. The ethics of this research have been debated in political, religious, and scientific arenas, and as the controversy continues, those in the media continue to recount the various breakthroughs, setbacks, and ethical dilemmas associated with the research. As a result, it has become more important than ever to discover how stem cell research has been portrayed in the media, and in some way, to work towards understanding how this portrayal may have affected the public.

This paper details research into the framing of stem cells in Canadian newspapers since the turn of the millennium. The concept of media framing was employed to evaluate this portrayal, and a selection of articles was sorted according to four categories that represented the framing of stem cell research in these articles. The four categories were: possibilities, revolutionary, cautionary and ethical debate. While the possibilities frame was the most prevalent and most commonly used frame across the country, there were significantly fewer articles framed that way in Western Canada than in Eastern Canada. However, the ethical debate frame showed the opposite trend, with more articles framed that way in Western Canada than in the East. There were also changes in the prevalence of the possibilities and ethical debate frames over time, from 2000 to 2009.

KEYWORDS
Canada; media frame; newspapers; stem cell; stem cell research

Introduction

Stem cell research has become one of the most promising, yet one of the most controversial scientific areas to develop in the last few decades. Stem cells' medical promise comes from their two unique abilities:

- Their ability to self-duplicate: to continually divide themselves into two daughter cells identical to the original cell.
- Their ability to differentiate into any other cell type: they can become, and function as, any other type of cell in the body.

These skills have provided researchers with the ability to study and treat a large variety of degenerative diseases, and those in the field believe that stem cells will provide cures for Parkinson's, Alzheimer's, and many other diseases in the near future. However, a great deal of controversy has arisen over the generation of stem cells, since one of the primary sources of these valuable cells is a human embryo.

The media's portrayal of this controversial research is reflected in the 'framing' of articles that discuss it. According to Tankard, "a frame is a central organizing idea for news content that suggests what the issue is through use of selection, emphasis, exclusion, and elaboration" (p. 100-101). Frames have been shown to have a significant impact on the views and opinions of the reader since a frame often has the effect of biasing the reader, without their knowledge.

In fact, according to Nisbet (2003), "the mass media have played an integral, interactive role within scientific controversies generally and the stem cell debate specifically" (p. 38). The specific role of Brazilian and United States newspapers in the stem cell debate has been detailed by Raul Reis (2008), who researched the framing of U.S. newspaper stem cell coverage, and noted that it has been dominated primarily by political and ethical themes.

Tankard's definition of framing, as well as Gamson and Modigliani's 'media package' approach to the study of framing was used to evaluate Canadian

newspapers, previously unstudied in this matter. This research was designed to establish what frames have been used in the last ten years by various Canadian newspapers when discussing stem cell research, and how the use of these frames has changed from one region to the next and from one year to the next.

Combined with future work, it is hoped that this research will offer valuable insight into the public perceptions of stem cell research in Canada.

BACKGROUND ON STEM CELLS

The United States National Institute of Health defines stem cells as "master cells, with the ability to grow (differentiate) into any of the body's more than 200 cell types" (Medicine Net, 2001). These cells have the potential to serve as a repair system for the human body, replenishing other cells, while themselves dividing and reproducing theoretically without limit to sustain the body's stem cell population (National Institutes of Health, 2008).

These two characteristics of stem cells - their ability to differentiate into other cells types, and their ability to reproduce themselves indefinitely – make them extremely versatile and valuable to the scientific and medical communities.

Human stem cells fit into two categories: embryonic stem cells and adult stem cells. Embryonic stem cells, as the name implies, are derived from embryos. They are most commonly derived from the embryos that are produced and left over after in vitro fertilization procedures, and then donated to research. Adult stem cells are found throughout an adult's mature tissues in very small quantities. These cells are left over after embryonic development, and then proceed to multiply, replacing and replenishing damaged tissues in the body (National Institutes of Health, 2008)

Large sections of the medical community believe that stem cells hold the promise of being able to treat and cure degenerative diseases, such as Alzheimer's and Parkinson's diseases. This promise stems from the thinking that if researchers can cause certain stem cells to differentiate into specific cell types, then they can create cells to replace faulty ones in the body. For example, the American National Institute

of Health has stated that it may in the future become possible to generate healthy heart muscle cells in the laboratory and transplant those cells into patients with chronic heart disease (National Institutes of Health, 2008).

Adult stem cells are already being used in many treatments, which generally involve the removal and controlled replacement of stem cells from the patient's own body. Research is still ongoing with embryonic stem cells, and while no treatments are yet in use, many feel that there is a great deal of potential that is as yet untapped.

The debate over the use of stem cells primarily surrounds the use of embryonic stem cells. As mentioned previously, embryonic stem cells are derived from embryos unused after in vitro fertilization procedures. Because acquiring these stem cells results in the destruction of an embryo, the procedure has, by some, been considered equivalent to abortion - an act considered in this worldview to be morally wrong.

The Catholic Church is one of the most outspoken groups that protest the use of embryonic stem cells. U.S. Bishop Donald Wuerl once wrote that "While (a stem cell) is a tiny speck, it nonetheless contains the elements out of which comes the fully developed human person" (American Catholic, 2005). As such, the stance of the Catholic Church is that the use of embryos in research is "a gravely immoral act" (U.S. Conference of Bishops, 2008).

The International Society for Stem Cell Research counters this view to some extent, by saying that "...embryonic stem cell research and therapy would use donated embryos that, by virtue of donor instructions, will never enter a uterus" (International Society for Stem Cell Research, 2005).

While use of embryonic stem cells has been debated at the highest levels of religion, it has also been a 'hot-button' issue in some of the highest levels of government - particularly in the United States. Former U.S. President George W. Bush in particular has been part of a large amount of controversy regarding the use of stem cells. In August, 2001, he announced that all new stem cell research would be banned from receiving federal funding. In essence, aside from privately funded research, he prevented any new stem cell research from starting, as of the date of his

announcement (National Institutes of Health, 2008). Nearly eight years later, in March 2009, this ban was lifted by the new U.S. administration under President Barack Obama.

In Canada, there were no laws or guidelines governing stem cell research until March 2002, at which time "Guidelines for Human Pluripotent Stem Cell Research" were put into place by the Canadian Institutes of Health Research (CIHR). These guidelines give restrictions on the origin of stem cells under research, and how ethically they are acquired, but otherwise do not prevent the study of stem cells in any way.

BACKGROUND ON FRAMING

The media's portrayal of stem cell research is reflected in the 'framing' of articles that discuss it. In *The Empirical Approach to the Study of Media Framing,* James Tankard identifies a media frame as a "central idea" that lies behind a story, providing an orientation to a subject's relevance, importance, value and context. These frames often have the effect of biasing the reader about the subject without their knowledge, and can therefore have a significant impact on the reader's - and in a broader context, the public's - views and opinions.

To use an analogy put forward by Gitlin in 2003, a media frame is like a picture frame, in that the way a frame affects a media article is similar to the way that a picture frame affects the image it surrounds. Various picture frames encourage the viewer to look at the image from different perspectives and in the same way, the framing of a media article emphasizes certain perspectives on the material in the article and encourages the reader to take a particular view.

According to Tankard, "framing recognizes the ability of a text to define a situation, define the issues, and to set the terms of the debate". "And", Tankard adds, "convincing others to accept one's framing means to a large extent winning the debate" (2003). This "convincing" likens framing to a magician's slight of hand,

where attention is directed at one point, while manipulation happens at another. So framing can have a significant effect on the opinions and feelings of its audience. Gamson and Modigliani (1989) identified five framing devices (metaphors, exemplars, catchphrases, depictions and visual icons) and three reasoning devices (roots or causal analysis, consequences or effects, and appeal to principles) that they suggest typify frames. In addition, according to Entman (1993, 2004), frames in the media emerge as the presence or absence of keywords, common phrases, images, and sources of information. Whatever the manifestation of a frame, it can have a significant impact on the reader of the article.

As noted by Priest and TenEyck in 2003, the media is the primary source of science and technology information for a significant portion of the population. As a result, media framing of science issues is likely to have an effect on the majority of the public. In fact, once a particular frame on an issue becomes predominant in the media, and in the public eye, it becomes very difficult to shift the image of the issue to another perspective (Schön and Rein, 1994).

Because framing can have such a profound and long-lasting effect on the public, there is a fundamental need to analyse and review the framing of science issues in the media, and many researchers have taken on this challenge, though some areas are more heavily studied than others.

For example, In 2005 Anderson et al reviewed the framing of nanotechnology in British newspapers during a pivotal time in their development. They discovered that newspapers predominately framed nanotechnologies with "strong optimism, when in relation to the benefits of nanotechnologies combined with concerns about the risks and uncertainties about possible benefits or risks". Anderson also noted a prominence of newspaper articles with "science fiction" frames.

The framing of many biotechnologies (specifically in agricultural biotechnology and the area of genetically modified foods), has been researched across the United States, in both elite newspapers and local newspaper coverage (Crawley, 2007), and has been shown to generally reflect frames of economic prosperity and progress. (Marks, 2001; Ten Eyck, 2001)

The framing of stem cell research specifically has also been researched. Raul Reis (2008) noted the similarities and differences in newspapers' framing of stem cells between Brazil and the United States. He noted that this framing was predominately positive and scientific in Brazil, while US newspaper articles tended to frame stem cell research in terms of its political and ethical dimensions.

These studies, and others, highlight how media frames are used by the media, and how analysing these frames on a topic such as stem cell research allows for a better understanding of how the topic is portrayed, and perceived, by the public.

Questions

Research on the effect of media framing in various scientific areas, including stem cells, is continuing. Already the way in which newspapers in the U.S. and Brazil frame stem cell research has been examined, but Canadian newspapers have not yet been reviewed in this area. As such, this research sought to answer the following questions:

1) What frames are most commonly employed by Canadian newspapers when discussing stem cell research?

2) How has the use of these frames changed over the last 10 years?, and

3) How commonly are each of these frames used by newspapers across Canada?

Combined with future work, it is hoped that this research will offer valuable insight into the public perceptions of stem cell research in Canada.

Method

Newspaper articles were gathered from the Vancouver Public Library's "Newsstand" archive, which is Canada's largest national public-access newspaper electronic archive. Ten newspapers from a variety of locations across Canada were

chosen for analysis. This selection was based on the years of availability of the newspaper's archive, and the location of the primary distribution of the newspaper.

The newspapers were selected on the basis that: they had a complete archive, without interruption, dating from at least 2000 until the present; and as a whole, they covered as large and diverse a geographic area as possible within English-speaking Canada.[1]

According to these selection criteria, the following newspaper archives were selected for analysis[2].

From Western Canada:

- The Edmonton Journal
- The Vancouver Sun
- The Calgary Herald
- The Saskatoon Star-Pheonix

From Central Canada:

- The Ottawa Citizen
- The Hamilton Spectator
- The Windsor Star
- The Toronto Star

From Eastern Canada:

- The Fredericton Daily Gleaner
- The Moncton Times-Transcript

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[1] This excludes Quebec, where the French language would impede the analysis of the newspapers.

[2] Additional newspapers would have been selected from Eastern Canada had there been any others that met the first newspaper selection criteria: an archive dating back to 2000.

From the selected newspapers, articles were selected for analysis according to the following criteria. The article must:

1. have "stem cell" in either the lead or headline,
2. have been published after January 1, 2000,
3. contain at least 100 words,
4. discuss stem cells directly for a minimum of one-third of the length of the article[1],
5. not discuss stem cell research that *solely* addresses the cancer-causing elements of stem cells.[2]

Searching the newspaper database using selection criteria 1 and 2 generated a list of well over two thousand articles. Of these, every fourth was selected to provide a list of randomly selected articles. Selection criteria 3, 4 and 5 were ratified after this random selection to save time. This process resulted in a chronologically sorted list of 296 articles for frame analysis.

The media package approach, as outlined by Gamson and Modigliani in 1989, was selected to review the framing of these articles. The framing and reasoning devices (discussed below) of the media package approach seemed best suited to capture the context of the themes in stem cell research. This is because the media package approach evaluates the keywords and common language that typifies a frame. In comparison, two other empirical techniques - the multidimensional approach

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[1] This provision was added to avoid analysis of articles that mention stem cells because of their relation to another topic, but contain no substantial frame on stem cell research. Rather, these articles more commonly frame the main topic, and stem cells are secondary to that topic. Topic examples commonly excluded on this basis include: cloning, politics and celebrities.

[2] Some articles only discussed stem cells as cells already in the human body, which have the potential to cause cancer. This research does not fit into the more common stem cell research framework, and does not have the same ethical considerations. As a result, this selection criterion eliminated those articles that met all the other criteria, but did not contain information on stem cell research as it is most commonly known.

(Swenson, 1990) and the list-of-frames approach (Tankard, 1990) - do not rely on the text of the articles as much as they rely on other aspects of the article, such as author, title, quotes and concluding statements.

The media package approach revolves around identifying the key words, phrases, and common language that define a particular frame. These keywords are assembled into a paragraph of paraphrased and quoted material that is characteristic of that particular frame.

For example, Gamson and Modigliani developed a media package that framed nuclear power in terms of progress. They used phrases and words from pamphlets and other writings by nuclear power advocates, and created a paragraph summarizing the most typical comments and phrases used in that frame. To create the package, they looked specifically for the use of five framing devices (metaphors, exemplars, catch phrases, depictions, and visual images) and three reasoning devices (roots or causal analysis, consequences and effects, appeal to principals).

Following this technique, a "media package" was developed for each of the possible frames. Keywords, phrases and common language were gathered from a selection of newspaper articles, and from literature written by key players in the issue, who have displayed consistent values and opinions. For example, the phrase "gravely immoral act", coined by the Catholic Church in reference to stem cell research, was included.

Using the list of keywords and phrases, four frames were created. These frames were designed to be exhaustive, and as mutually exclusive as possible. This increases coder agreement, and therefore the robustness, and repeatability of the framing process.

"Media packages" were developed for four frames:

- The Possibilities Frame
- The Revolutionary Frame
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Scientists are making concrete steps towards using stem cells in medicine. Research in this area might one day lead to treatments and cures for many degenerative diseases, but researchers say it's early yet. Because the cells have ability to differentiate into any other type of cell in the body, their potential for medical treatments is vast. The research for many of these therapies is currently underway, and only time will tell if they are as useful as researchers hope. This current research is certainly promising.

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A breakthrough has been made in cancer research. John Smith, a chemotherapy patient, is already recovering more quickly than anticipated. Even to physicians leading the study, his results have been remarkable. The chameleon-like powers of the stem cell have made anything possible, and these cells have become invaluable to researchers. The revolutionary technique has shown that stem cells have the ground-breaking potential to treat and possibly cure many diseases, including Parkinson's and Alzheimer's, and could in fact provide insight into cures for cancer and paralysis.

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While there could be some health benefits derived from stem cells, most of the research is under debate, and patients are often given to false hopes regarding the success of the treatments. There are potential pitfalls and significant dangers associated with the treatments. Long-term effects could include increased susceptibility to cancer and genetic mutations, meanwhile, actual benefits are often over-exaggerated. The treatments and medical claims need to be treated with caution, though there are potential benefits of the research.

THE ETHICAL DEBATE FRAME

> *Funding and supporting stem cell research has been a controversial issue to say the least. It has been deemed by some to be the most pivotal research of our day, while others call it a slippery slope. The ethical dilemmas surrounding the issue are extensive, and must be considered ahead of potential health benefits. Many people have expressed concerns regarding the destruction of embryonic life and consider it akin to abortion. Some say this research is a gravely immoral act, while others deem it to be vital to progress. Politicians, religious leaders, and scientists all face criticism for their moral stance, and the issues must be resolved.*

After each media package was created, coding began on the articles selected in previous steps. Coding involved the sorting of each article into its respective frame (Progress, Revolutionary, Cautionary, Ethical Debate), using the media package paragraphs as generalized examples of each frame.

In some cases, articles contained elements of more than one frame. If an article contained approximately equal elements of more than one media package, coders were instructed to place greater importance on those elements found in key areas of the article, such as the headlines, leads, quotes, and concluding statements.

In this way, each article was sorted into its most applicable frame.

The quality of the sorting process was evaluated using coder agreement as an indicator. Among 10 coders, there was 82% coder agreement. Following Tankard (2003), I held that 80% agreement was acceptable, and therefore deemed the sorting process to be valid.

All the applicable data, (which includes the date of publication, region of publication and the most applicable frame) was gathered into a spreadsheet for analysis. A Chi squared statistical analysis was performed to determine the significance of resulting frame distributions.

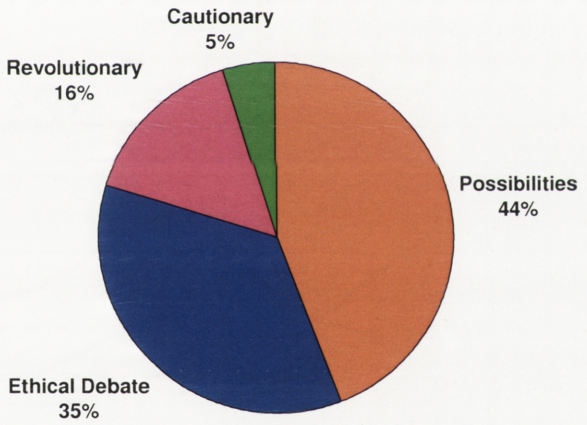
Results and Discussion

Question 1: What frames are most commonly employed by Canadian newspapers when discussing stem cell research?

Overall, as shown in Figure 1, articles tended to more frequently reflect the possibilities frame than any other, with 44% of articles fitting into that frame. Second most common frame was ethical debate, accounting for just over one-third (35%) of the articles. The revolutionary frame and the cautionary frame each made up only small percentages of the total number of articles, country-wide.

The possibilities frame, which discusses stem cells in a positive light, citing the future medical advances of the technology was the most common. While it cannot be claimed that this causes (or is caused by) general public opinion, previous research has shown frames can have a significant effect on the readers' mind set (Richardson, 2005).

Figure 1:
Frame Distribution Among all Articles



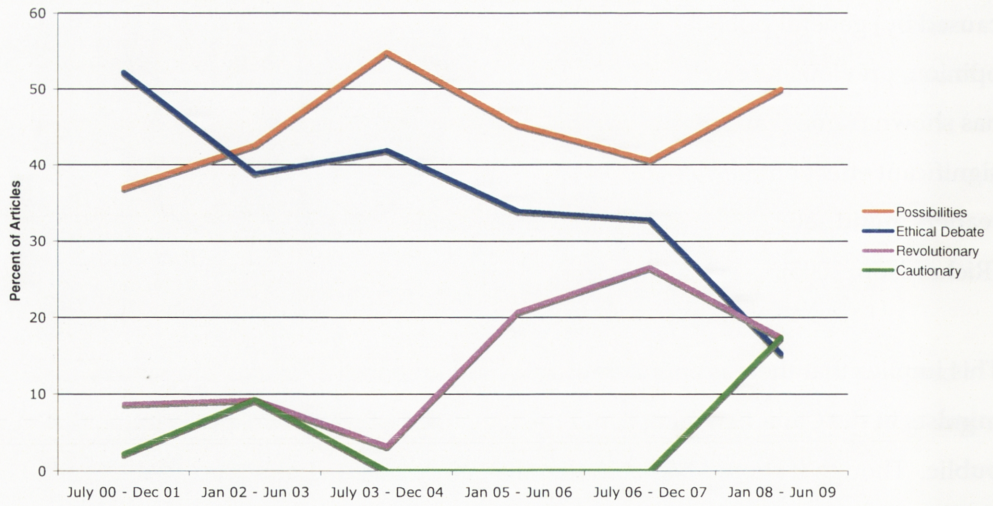
This implies that there is an inherent and predominantly positive "possibilities" mindset in the Canadian media, and the likelihood of this same mindset in the public. Though it should be noted that the ethical debate frame prevalence is similar to that of the possibilities frame, indicating that in the public's view there are likely also a great deal of ethical concerns over stem cells. The relatively limited use of the cautionary and revolutionary frames indicates that the themes of those frames are not common in the media, and are perhaps less common in public thinking.

Question 2: How has the use of these frames changed over the last 10 years?

While the trends shown in Figure 1 reflect the predominance of each frame during the total nine years studied, it is important to note that there are some significant changes in this frame distribution from the beginning of the studied time range (January 2000), to the end (February 2009).

In fact, as can be seen in Figure 2, the ethical debate frame was most prominent at the beginning of the studied time frame. However, there was a significant decrease in the frequency of the ethical debate frame over the course of the nine years studied, and this decrease quickly caused the possibilities frame to take over as the most commonly used of all four frames. This decline continued until the end of the studied time, at which point the ethical debate frame was comparable to the revolutionary and cautionary frames in terms of frequency. A statistical analysis showed these trends in the ethical debate frame and the revolutionary frame to be significant, as $p<0.005$ in both cases.

Figure 2
Framing Trends from July 00 until January 09



Also seen in Figure 2 is a significant ($p < 0.05$) increase in the pervasiveness of the revolutionary frame over time. Beginning in approximately mid 2004, the incidence of the revolutionary frame began a dramatic increase, and peaked in mid-late 2007.

The possibilities frame maintained a consistently high prevalence throughout the entire study period, and the cautionary frame remained virtually negligible. In fact, the cautionary frame reduced to zero percent of the total articles for a period of approximately 4 years from mid 2003 until mid-late 2007.

As discussed earlier, these trends in frame distribution are likely to help shape the trends in public opinion over time. Thus, the significant decrease in the prevalence of the ethical debate frame and rise in the revolutionary frame indicates a noteworthy shift in public opinion on stem cells from ethically debatable to medically remarkable.

The lack of cautionary-framed articles for a four year period was interesting, and it was hypothesized that the two "sections" of cautionary articles were in fact different. Further investigation showed that in fact the articles framed cautionary until 2003 discussed issues surrounding western medical research, while cautionary articles after 2006 generally discussed eastern (specifically, Chinese) stem cell treatments. Though the keywords and themes were similar between these two groups, and thus they were placed into the same frame, future research might consider separating these two topics into separate frames, as it shows how the development of new issues in the technology (Chinese stem cell treatments) can cause the emergence of new media frames.

As shown by Reis (2008) stem cell media framing can also be affected by events, such as medical breakthroughs, and political milestones. While no causation can be studied in this type of research, some interesting correlations can be shown.

- The six month period directly following George Bush's 2001 announcement showed the largest rise in the percentage of articles in the ethical debate frame of any 6 month period, though the steady decrease in the ethical debate frame soon returned this frame to its original level.
- The revolutionary frame prevalence peak (in late 2006/2007) coincided with the development of hybrid stem cells (one of the largest breakthroughs in stem cell research to date), and the opening of numerous cord-blood banks across Canada.

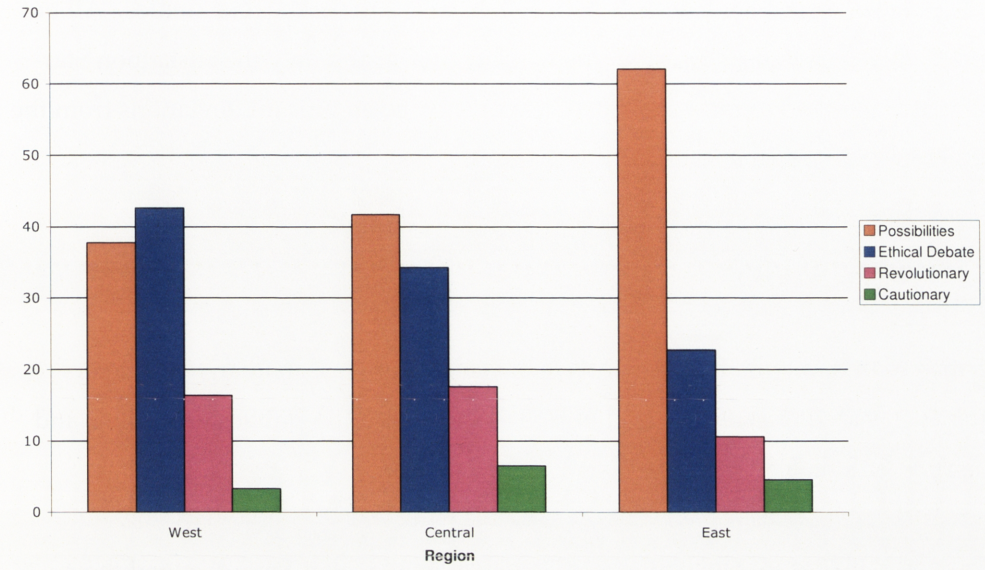
The changes in the prevalence of the ethical debate and possibilities frames over time also suggest a qualification of Schön and Rein's (1994) claim that it is difficult to shift the image of an issue to another perspective, once one frame has become predominant in the media.

Question 3: How commonly are each of these frames used by newspapers across Canada?

In addition to trends over time, there was also a significant change in the frame distribution between regions. The articles were grouped according to their region of publication. Western Canada included articles published by the Edmonton Journal, Vancouver Sun, Calgary Herald and the Saskatoon Star-Pheonix. Central Canada consisted of articles published by the Ottawa Citizen, Hamilton Spectator, Windsor Star and the Toronto Star. Eastern Canada consisted solely of articles published by the Fredericton Daily Gleaner and the Moncton Times-Transcript.

As seen in Figure 3, there were significantly (at the $p<0.05$ level) more possibilities-framed articles published in Eastern Canada than in Central and Western Canada. This accompanies the reverse change in the prevalence of ethical debate-framed articles: there were significantly fewer articles with an ethical debate frame published in Eastern Canada than in Western Canada, with Central Canada being an average of the two extremes. As a result, it is likely that there is a difference in public perceptions and opinions between these regions, specifically regarding the themes brought forth in the possibilities and ethical debate themes. For example, it is possible that Western Canadians have gained a view of stem cells that involves more ethical controversy and debate than Eastern Canadians, for whom the possibilities for stem cells in future medical treatments might seem more paramount.

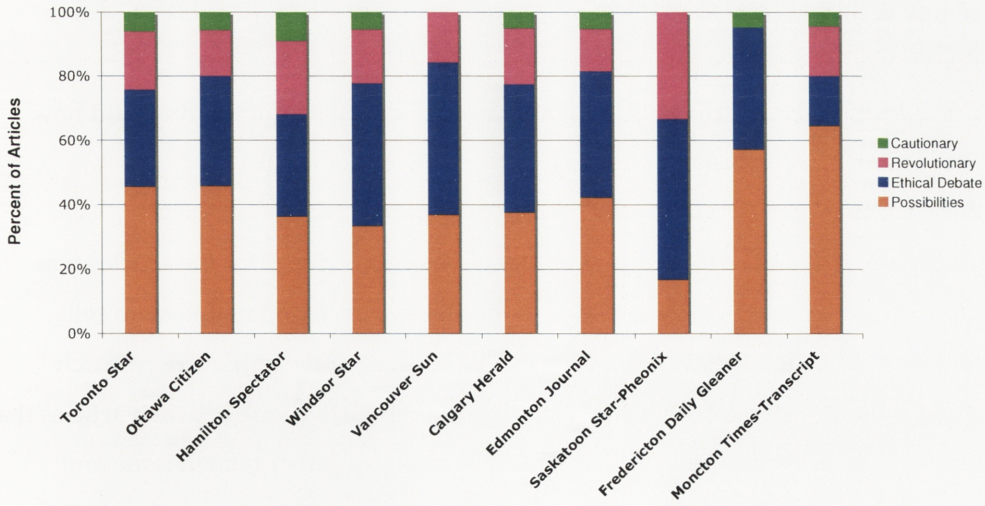
Figure 3
Frame Distribution by Region



The revolutionary frame and the cautionary frame both showed no significant change from one region to the other.

Breaking down these regions into the individual newspapers, as shown in Figure 4, shows that no one newspaper was accountable for these larger trends.

Figure 4
Frame Distribution by Newspaper



In addition, the frame distribution by newspaper shows that there is reasonable continuity of the overall frame distribution across all of Canada. Over the course of the studied period, each newspaper used at least three of the four frames. All but three newspapers used every frame to some extent, and only the Saskatoon Star-Phoenix and the Fredericton Daily Gleaner showed significant deviations from the Canada-wide distribution shown in Figure 1.

Conclusion

This research into the framing of the stem cell debate in Canadian newspapers represents an important contribution to the influences on public perceptions and opinion on stem cell research.

Primarily, it provides evidence that Canadian newspapers have changed their framing of stem cells since the turn of the millennium (hence qualifying Schön and Rein's (1994) argument that frames are difficult to change), but that the overall themes of future possibilities, and ethical debate have been paramount. In addition, there is a significant change in frame distribution (between possibilities and ethical debate) from one region of Canada to another. While the causes of these trends are unknown, the effect of media framing on the public has been well documented for many sciences and technologies, and the effect of this framing of stem cell articles on the public could be far reaching.

Future research could investigate the causes of stem cell media framing, and how this framing directly influences public perception and opinion.

In addition, it should be noted that while the selection criteria for the articles was helpful in limiting the articles studied to those that directly related to stem cells, there were some interesting comparisons lost because of them. Future research should therefore also consider studying the differences in frame between articles that address stem cells primarily, and articles that discuss another related issue and mention stem cells only briefly. Examples of other related issues include: cloning, cord blood, politics, abortion, and in-vitro fertilization.

The influences on the public of the media framing of stem cells is yet to be discovered in its entirety, however this research shows that Canadian newspapers frame stem cell research primarily with a positive "possibilities" view, while the ethical debate surrounding this controversial research appears to be dwindling. Future research could investigate the affects of these frames on public perceptions of stem cell research.

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APPENDIX 1: CODER BRIEFING AND INFORMATION SHEET

Introduction and Briefing

First, let me offer my sincere thanks for your help with my research. Your input provides me with quality control feedback that is essential to my work.

My research looks at the way in which newspaper articles about stem cells are framed. Put very simply, framing is a theme or feeling that is portrayed by an article. This research involves describing the possible frames, and then sorting a large variety of stem-cell newspaper articles into groups, each reflecting a different frame. In order to be sure that the sorting process is repeatable by other researchers, I need to test how reliable this sorting step is. That is where you come in. Your job is to sort 10 articles into their respective frames, and answer a few questions about each. Your sorting will be compared to others, and if 80% of the newspaper articles reviewed by you and other coders are sorted the same way, then the research is repeatable. There is no right or wrong answer for you!

In this document, and attached in this email, you will find:

1. One "Media Package" sheet, describing the media frames
2. Ten articles, selected from a collection of over 150 such articles which are being used in my research
3. One "question" forms
4. One "answer" form

First, you need to understand the basics of what a frame is.

> In general, a media frame as a "central idea" that lies behind a story, providing an orientation to a subject's relevance, importance, value, and context. These frames often have the effect of biasing the reader without their knowledge.

A media frame can be looked at using the metaphor of a picture frame. The way a frame affects a media article is analogous to the way that a picture frame affects the image it surrounds. For example, a metal picture frame and an elaborate wooden frame would emphasize different elements and moods in a picture. The various picture frames encourage the viewer to look at the image from different perspectives. In the same way, the framing of a media article emphasizes certain perspectives on the material in the article, and encourages the reader to take a particular view.

Another metaphor is that of a house frame. In architecture, the frame of a building serves as an organizing structure upon which the rest of the house is built. In the same way, a media frame can be considered the central organizing idea upon which a story is built.

Both of these analogies have the same purpose: to show that the frame of the article has a direct impact on how the content of the article is viewed by readers.

Once you feel you have an understanding of the basics about what a frame is, please read the media package sheet. Each "package" contains a paragraph that gives an example of the frame. These paragraphs are developed using language, metaphors, and key words from one particular "outlook" on stem cells. They should be considered the over-the-top examples of the frame. The articles you read will not be nearly so blunt!

After reading all four media "packages" (paragraphs), please read each of the ten articles you have been given, filling out the answer form as you go. You should refer back to the media packages any time you want to. Until you send your answers to me, you are free to change any of your answers, so if you feel after reading ten

articles that you misjudged an earlier one, you should feel free to go back and revisit it.

Remember: A frame is the "overall" message of an article. Almost all newspaper articles will mention different viewpoints, so, read the entire article, and pay special attention to opening and closing paragraphs, titles, and sentences that have summation words in them like "In conclusion..." or "So in general...", and also watch out for sarcasm, which could throw you off – then make your decision about which frame the article *best* fits. There is no right or wrong answer!

If you have questions at any time, do not hesitate to contact me, and thank you again for your help with this research.

Lauren

Coder Question Sheet

For each article, answer the following questions. If you are in Canberra, please return your answer sheet to me when you are done. If you are filling out these forms long distance, please feel free to answer the questions in a word document, or print, answer, and scan the completed answers.

In your opinion, does this article fit more closely into the:

Possibilities frame
Revolutionary frame
Cautionary frame, or
Ethical Debate frame

How confident are you with your answer to question 1?

Very confident
Somewhat confident
Not at all confident

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